Examining information management practices in disaster preparedness in the Philippines: The Case of Legazpi City, Albay Province

Sherwin E. Ona[1], **Rabby Q. Lavilles**[2] **and Emmanuel C. Lallana**[3]

(1) De La Salle University; (2) Mindanao State University and (3) Ideacorp, Inc.

Corresponding Author: Sherwin E. Ona (Sherwin.ona@delasalle.ph)

Abstract

The need to improve local capacities in the Philippines is crucial in mitigating and responding to future disaster events. Despite being one the most disaster-prone countries in the world, national protocols remain inefficient, marred by corruption and poor inter-agency coordination. In addition, the current top-down and reactive practices have proven to be inadequate in responding to the needs of various stakeholders. In our study, we examined these disaster preparation practices through a qualitative-descriptive research design and by using disaster information management (DIM) as our framework. Using this approach, we focused on the disaster preparedness practices of selected barangays (Legazpi City) and their partner organizations. We also examined their information needs and the current ICT tools in disaster preparedness. Initial results of our study point to the difficulties in the use of information highlighting serious gaps in capacity, infrastructure as well as the efficacy of the current ICT tools.

Key words: Disaster information management; climate change adaptation; disaster preparedness

1. Background of the Study

A closer look at the current Philippine disaster risk reduction management (DRRM) practices reveal its traditional civil defense-oriented nature. This nature is characterized by top-down (unidirectional) programs and information that are focused on disaster response and rehabilitation. Furthermore, it has a centralized nature that places much responsibility on the shoulders of the national government, thus treating local governments and its constituents as disaster aid recipients rather than active partners. On the other hand, a closer examination of the prevailing literature reveals a myriad of new practices that highlights the importance of determining demands, needs and on how to leverage indigenous information sources from local communities. These practices are often governed by social relations, use of information communications technology (ICT) and community data being managed at the village and local government levels.

In this paper, we examined the current community DRR practices using the disaster information management (DIM) perspective. In this view, our efforts focused on the following DIM concepts: a) Information flow and use; b) Identification of data sources and c) ICT tools used by the community-based DRR actors.

To further understand the needs and practices, we adopted a qualitative-descriptive research design, focusing on the Diocese of Legazpi and selected participants from the city government of Legazpi, Albay and selected members of the academe. At the end of the paper, we presented recommendations on how to further enhance DIM practices and discussed the future directions of our work.

1.1 Viewing the phenomenon using the Disaster Information Management (DIM)

Recognizing disaster-related data/information as a vital resource, the Hyogo Framework of Action (HFA) (2011) stressed the importance of information management (IM) and the use of relevant technologies to address DRRM challenges. The HFA cites the need for IM practices to support the phases of the DRR cycle. These IM practices are the following: (a) collection/storage of data- this includes the sorting, digitization of indigenous data and use of cloud technologies; (b) Use of information to produce new knowledge through data analytics, digital mapping among others; (c) Promoting collaboration and the opening of new communication channels through the use of ICT mediums (e.g. Social media, mobile, etc.). The HFA also cites the importance of building capacities through the presence of the right skills set and policy development (UN APCICT, 2011).

Similarly, the disaster information management (DIM) concept supports this HFA call by ensuring that emerging technologies and practices ensure accessible, timely and useful data as well as its high degree of integrity. DIM aims to transform disaster information (e.g. Vulnerabilities, history, risk, impact and early warning) into vital resources (Mutasa, 2013). This can be done by integrating crowd-sourced information to the traditional sources, enabling communities to collaborate, strength information flows, and generate/share information to purposeful recipients (Quiang et al 2014) (Zheng et al, 2013). Similarly, Li et al (2014) stressed that an effective DIM should be capable of collecting, organizing, analyzing and sharing disaster-related information. It must also respond to users' needs and extract patterns and trends from historical data. However, DIM practices are often characterized as ambiguous, often coming from various sources and channels as well as having different formats. Bolton and Stolcis (2008) stressed that these conflicts with traditional DRR management practices often lead to limited information sharing and horizontal communication among DRR actors and stakeholders. This view also leads to the inability of decision makers to account for wicked problems often missing the multi-faceted nature of the phenomenon that can affect the quality of the intervention (Lassa, 2012).

In addition, further examination of the literature suggests the dynamic, non-linear and discontinuous nature of a disaster environment, highlighting the need to further understand the phenomenon (Bolton and Stolcis, 2008) (Bergstrom et al, 2016) (Day, 2014). For instance, in studies examining the use of social media, Starbird et al (2015) and Palen (2008) highlights the occurrence of misinformation and describes the current information flow as unidirectional, arguing that these issues often lead to the failure to integrate information coming from such sources. While Carney and Weber (2015) point to trustworthiness of social media sources that inhibits its acceptability in DRR related activities.

Another issue affect DIM is heterogeneity of information sources. This phenomenon further adds to the difficulties of using and managing DRR-related information. Zheng et al (2013) acknowledged these difficulties in information and dissemination and exchange due to its multiple sources which is made more complicated with the occurrence of redundancy, problems of accuracy and a variety of reports. In addition, Li et al (2017) argues that these concerns on accuracy and redundancy can be traced to how information are captured and evaluated as well as identifying their sources. In addition, Hristidis et al (2010) further dissects the heterogenous nature of information sources by highlighting the nature of disaster information as having the following: a) Large number of users and producers with varying degree of trustworthiness; b) Lack of a common or standard terminology; c) Time bounded and sensitive and d) Disaster information as having both static and dynamic (streaming) characteristics. Lastly, Mutasa (2013) suggests the need to view disaster information as a relationship between the disaster event, the people involved and their environment. This view includes the issues on access to information, power relations and the need for an appropriate intervention to ensure the efficiency of the management process.

2. Methodology

With this, we focused on how information management is practiced in communities. To further understand this phenomenon, we put forward the following questions: (a) **What are the local information practices related to disaster preparedness?** (b) **What are the ICT tools that are being used to support these indigenous practices?** And lastly, (c) **what are the capacity and IM practice gaps that were experienced by these communities?**

To answer these questions, discussed below, are the phases of the research design.

> **Phase 1:** This phase of the design involves the planning and preparation activities which started with the review of existing Philippine DRR policies and best practices as well as an extensive literature survey on disaster

informatics. Our interest in best practices led us to the province of Albay, which has a nationally recognized DRR program known for its goal of achieving a zero-casualty rate. In the interest of scoping, we decided to focus on Legazpi city, Albay Province due to the openness of the local diocese and the local government of the city. We also coordinated with the Commission on Higher Education (CHED) Regional Office-5 (CHEDRO-5) for

Common Themes and Practices in Disaster Preparedness	Description	Specific Activities or Practices	ICT Tools/ Applications used	Possible Gaps
Disaster Awareness	Practices present in this theme are meant to push information to as wide area as possible. The main concern is to spread disaster related information to all.	Orientation seminars for Disaster Preparedness Newsletters Information Dissemination	Social Media and SMS (text) blast for information dissemination	Directing specific information related to individual or group needs are not being done Absence of measure of efficacy and mechanisms of accountability
Need to improve local capacities using ICT	This theme highlights the persistent need for enhancing the capacity of the communities and its stakeholders	Projects Harong and Shared Organizational Preparation Predetermining Evacuation sites	Digital mapping-use of this application is limited	Digital maps not fully utilized; Results of mapping were not cascaded to the villages
Vulnerability and Threat Assessment	The last theme highlights the need of the stakeholders to participate in vulnerability and threat assessment.	Mapping of Vulnerable sectors and Risk Areas Targeting of Service Recipients	Digital mapping-use of this application is limited	Inability to use social media feeds because of trust and volume issues. There is a need to encourage bottom-up participation by using ICT tools (e.g. Crowdsourcing, online-open mapping, etc.)

Table 1.0 Emerging Themes in Disaster Preparedness practices

participants from local state universities and colleges.

Phase 2: The second stage of the research involved data gathering. Activities within this phase included the development of questionnaires for the key informants as well as the conduct of the actual interviews and FGDs. Documents pertaining to the existing DRR programs and activities were also collected and review by our team. An expert in developing qualitative research questionnaires from the University of the Philippines assisted our team. Lastly for this phase, we also examined the websites and social media accounts of the local government and the diocese.

Phase 3: The third stage of the design focused on data analysis by using the critical incidence technique (CIT). This approach enabled the team to establish patterns and themes in the existing DRR practices of Legazpi City. The results were validated in a workshop with the SAC, parish participants and representatives from the local academic community. Another validation meeting was held with research partners from the UK-Newton network.

3. Results and Discussion

Table 1.0 shows disaster awareness as a common theme that emerged from our data gathering activities. This theme was linked to the importance of pushing early warning information using traditional ICTs like mobile phones and social media. However, the participants also noted that are multiple sources of disaster-related information which results in difficulties in sorting and prioritizing. Another challenge is the inability to push (or target) sector-specific community information (e.g. PWDs, senior citizens, women, etc.) during pre or post disaster events. These findings are consistent with the observations of Zheng et al (2013) and Li et al (2017) on accuracy and capture of disaster-related information. On the aspect of improving local capacities to use ICT, it was pointed out that aside from mobile-SMS blasts, the participants see the need for digital mapping that can be used by the community. Aside from creating hazard maps, the participants floated the idea of mapping participating households of project Harong (volunteer households for temporary shelter) and the integration of existing community data sources from the barangays and local governments. Participants also suggested that there should be a way to measure or assess the efficacy of these applications. In addition, key informants cited the challenges that are usually encountered in the use of ICT in disaster preparation. These are the following:

(a) *Inadequate SMS load*- it was pointed out that most of the mobile users are pre-paid

subscribers. Therefore, the cost of SMS, usually shouldered by the mobile owner, hinders the full-dissemination of disaster warnings; (b) *Poor signal quality of mobile and internet*- intermittent mobile and internet signals hamper the dissemination of information; (c) *Absence of electricity during disaster events*- additional weather warnings are not disseminated. Due to a power failure caused by precedent adverse weather/ volcanic events; (d) *Challenges in the use of the digital maps*- participants narrated that the MGB initiated a number of digital mapping activities in the past. However, they pointed out that the results of the mapping were not cascaded back to the communities. In instances where communities were given access to the digital maps, they were unable to use the maps due to the inadequate skills on how to use and interpret the mapping outputs.

Finally, the participants also suggested that the mapping application be integrated with the existing vulnerability and threat assessment initiative of the Diocese of Legazpi as well as the local and provincial governments. The idea of a common-single DRR digital map that is accessible and understood by all DRR stakeholders can help avoid confusion and misinformation.

4. Recommendations and Future Work

Our findings showed that most of the DIM practices in Legazpi city are mainly about pushing disaster-related information during the preparation phase of DRRM. This is done using SMS messages (text blast) and through social media. This technique relies on a general list of mobile numbers and does not customize information according to the needs of recipients. This technique is also one-way, thus lacks the needed feedback mechanism. Furthermore, there are existing practices of collecting community information, however, these were made using physical forms and are seldom digitized. Using the DIM as our lens, we characterized these practices as being in its initial stages and are thus inadequate to realize information sharing, and collaboration. Furthermore, the DIM process was also hampered due to the existence of multiple and voluminous information sources as well as capacity gaps.
For our recommendations, we see that importance of reexamining DIM practices and how

data/information can be sourced, stored, and used to address the information needs of all DRRM phases and stakeholders. In addition, we see the need to enhance digital/ICT capacities through a data literacy program designed to harness DRR-related data/information.

As for our future work, intend to continue our study on DIM practices by looking at studies on complex adaptive systems and the DIM-related practices of other communities. In addition, we will also examine how innovative ICT applications can be used to address the challenges of DRRM in communities. The possible applications are crowdsourcing, data analytics and block chain technologies. As part of our adherence to the idea of complex systems, we believe that an examination of the governance aspect through of the existing local policy environment and programs is also important to complete our understanding of community-level DRRM.

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